Potential of XBRL Dimensions for International Trade Statistics

09

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Explanation of symbols

.	= data not available
*	= provisional figure
x	= publication prohibited (confidential figure)
–	= nil or less than half of unit concerned
–	= (between two figures) inclusive
0 (0,0)	= less than half of unit concerned
blank	= not applicable
2007–2008	= 2007 to 2008 inclusive
2007/2008	= average of 2007 up to and including 2008
2007/'08	= crop year, financial year, school year etc. beginning in 2007 and ending in 2008
2005/'06–2007/'08	= crop year, financial year, etc. 2005/'06 to 2007/'08 inclusive

Due to rounding, some totals may not correspond with the sum of the separate figures.

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Abstract

Standardization of financial reporting is desirable to reduce the administrative burden on companies. To achieve this, the eXtensible Business Reporting Language (XBRL) has been developed. Almost 60% of the administrative burden on companies by Statistics Netherlands is caused by surveys about product trade between EU countries. Trade data cannot be filed in XBRL yet, because of the complexity of the Combined Nomenclature, the EU classification of traded products. Here, we describe a prototype of a dimensional XBRL taxonomy that enables reporting of trade concepts specified by product, using the recent XBRL Dimensions 1.0 specification. We show that a taxonomy can include a product dimension that is hierarchical, contains multilingual labels for each product, and allows instance creators to choose only the most detailed level of the product hierarchy. We also observe that the literature lags behind the developments, that domains seem redundant, that taxonomy creators still have insufficient control over an instance document, and that there are several inconsistencies in the Combined Nomenclature. We conclude that despite some flaws, XBRL Dimensions is a useful specification for reporting international trade in particular and dimensional information in general.

Keywords: standardization, administrative burden, EU classification of traded products, Combined Nomenclature, Dutch Taxonomy Project

1. Introduction

On 23 September 1999, NASA lost radio contact with one of the two Mars exploration spacecrafts in a $328 million project. An investigation revealed that one of the subcontractors used imperial units instead of metric units. As a result, the Mars Climate Orbiter entered the Martian atmosphere at a much lower altitude than intended and was destroyed by atmospheric friction (MCO Mishap Investigation Board 1999). This example illustrates the importance of international standardization. If we would all speak the same language, we could build the Tower of Babylon.

This report deals with standardization of financial reporting. External beneficiaries have become interested in the financial performance of companies since the issuing of shares, which dates back at least to the Dutch East India Company in 1606 and probably much earlier. Automation of financial reporting has become essential to reduce typing errors, paper-storage costs, fraud, and administrative burden. Standardization of financial reporting has also become essential with an increasing number of beneficiaries and the globalization of the financial market. To standardize financial reporting, International Financial Reporting Standards (IFRS) and the eXtensible Business Reporting Language (XBRL) have been developed over the past decade (Hoffman 2006; Engel et al. 2008).

IFRS defines standard accounting principles, whereas XBRL is an XML-based artificial language developed to structure and exchange financial information in an internationally standardized way (see Appendix 1 for definitions of some terms used in this report). The definitions and relationships of the financial reporting concepts have been captured in an international standard XBRL taxonomy (IFRS-GP), which was issued in 2005. National taxonomies have been developed as extensions to the IFRS-GP to account for nation-specific concepts. The Dutch Taxonomy Project (2008) was initiated in 2004 by the Ministries of Justice and Finance to reduce the administrative burden on companies by 25% in four years. Since 2007, Dutch companies can send their financial reports in XBRL to the Chamber of Commerce, the Tax Administration and Statistics Netherlands through the Government Gateway.

Almost 60% of the € 20 million of administrative burden on companies by Statistics Netherlands is a result of surveys on product trade between EU countries (Muller et al. 2007). These so-called Intrastat data are crucial for the national Balance of Payments, which is an important indicator of a country's economic state. Intrastat data are filed virtually 100% electronically; 20% using in-house software and 80% using IRIS, a software package developed by Statistics Netherlands. There are two disadvantages to the latter. First, IRIS does not accept data in XBRL format, which prevents reuse of data when reporting to other government agencies. Second, 85% of the IRIS data is entered manually (W.G. de Jong, pers. comm.), which is expensive and error-prone. Importing Intrastat data directly from a company's administration

using the XBRL standard would benefit many parties, including companies, national statistical institutes, Eurostat and customs.

One reason that could explain the current situation is that specifying international trade concepts by product is complex. The World Customs Organization (2008) has classified more than 200,000 commodities into about 5000 commodity groups, which the EU (2007) has subdivided into 9700 products ordered in no less than 11 hierarchical levels. A solution could be to incorporate this dimensional and hierarchical information in a dimensional XBRL taxonomy. This has become possible since XBRL Dimensions 1.0 was released in 2006 as a modular extension of the XBRL 2.1 specification (Hernández-Ros and Wallis 2006).

The aim of our study was twofold. First, we set out to develop a prototype of a dimensional taxonomy that allows reporting in XBRL of trade concepts by product. Second, we studied the possibilities and problems of applying XBRL Dimensions in general and to the data model of International Trade Statistics in particular.

2. Methods

To develop a prototype of a taxonomy containing the product dimension, we used an evaluation copy of Interstage XWand 9.0 Taxonomy Editor (35), kindly provided by Tadashi Okai of Fujitsu Ltd., Tokyo. XWand is a software package that facilitates creating dimensional taxonomies and instance documents. We first created a simple dimensional taxonomy in XWand. This requires import of two standard schema files, one defining the XBRL 2.1 Specification (Engel et al. 2008) and one defining the Dimensions 1.0 Specification (Hernández-Ros and Wallis 2006). We then exported the created schema files and linkbases as CSV files to study the format for import. Next, we created new CSV files in MS Excel with information relevant to international trade statistics. Before import into XWand, these CSV files had to be edited with a text editor to replace the semicolon separator with a comma separator, and to put element names between double quotes. The *targetRole*, *usable*, *contextElement* en *closed* attributes (Hoffman 2006) could not be imported but had to be added manually in the definition link of the template taxonomy.

We used the Combined Nomenclature 2008 to create the product dimension. The Combined Nomenclature is an 8-digit European specification of the Harmonized System. The Harmonized System is an international standardized system for 6-digit coding, naming and classifying traded products. Although virtually all international commodities are classified according to the HS, other product classifications exist (e.g. the NST/R used in transport statistics). We included English and Dutch labels that we downloaded from Eurostat RAMON (2008) and the National Bank of Belgium (2008) (Table 1). Supplementary units were downloaded from Statistics Netherlands (2008).

Table 1 Source of labels for each language and hierarchical level in the Combined Nomenclature 2008.

	Hierarchical level				
Language	Section	HS Chapter	HS Heading	HS Subheading	CN Subheading
en	R	R	R	R	R
de	R	R	R	R	R
fr	R	R	R	R	R
nl	R	R	R	R (labels not unique)	NBB

HS = Harmonized System, CN = Combined Nomenclature, en = English, de = German, fr = French, nl = Dutch, R = Eurostat RAMON, NBB = National Bank of Belgium

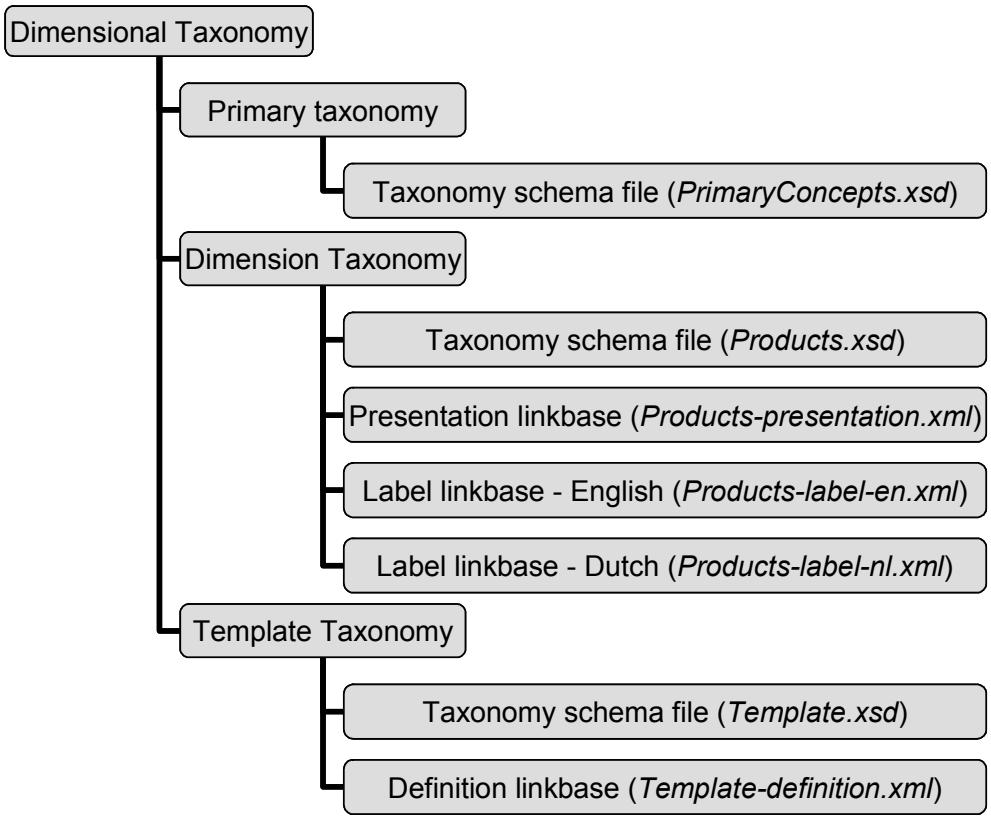

Figure 1 Structure of the dimensional XBRL taxonomy for International Trade Statistics, with traded product as dimension.

3. Results

3.1 Possibilities

3.1.1 Dimensional Taxonomy

In this section we describe the prototype of the dimensional taxonomy that we developed for International Trade Statistics. All XBRL files can be found at http://xbrl.cbs.nl/taxonomies/dimensions/international-trade-demo/default.htm. The dimensional taxonomy consists of three parts (Fig. 1): a primary taxonomy, a dimension taxonomy, and a template taxonomy. Each will be discussed in detail below.

In the primary taxonomy, the primary concepts are defined (Table 2). This corresponds to a non-dimensional taxonomy that can exist on its own. In our case, the primary concepts are the trade concepts that have to be reported in CBS-IRIS (Rameckers 2008). The concept names are in Dutch. For simplicity, we did not include any linkbases, but these could be added to the primary taxonomy if desired. For the same reason, we set most attributes to the default value. More realistic values can be implemented when moving beyond our proof of concept. The *balance* attribute ("debit" or "credit") is only relevant for monetary elements, and was not specified here. The *abstract* attribute is set to "false" for all primary concepts because all these concepts can have a fact value in an instance document. When the *nillable* attribute is set to "true", blank fact values are accepted in the instance document.

Table 2 Definition of primary concepts from CBS-IRIS in Primary Taxonomy *PrimaryConcepts.xsd*.

Name	Type	Substitution Group	Period Type	Balance	Abstract	Nillable
BTW-nummer	string	item	instant	*irrelevant*	false	true
NaamInformatieplichtige	string	item	instant	*irrelevant*	false	true
IntraHandel	boolean	item	instant	*irrelevant*	false	true
Regelnummer	string	item	instant	*irrelevant*	false	true
Administratienummer	string	item	instant	*irrelevant*	false	true
Goederenstroom	string	item	instant	*irrelevant*	false	true
StatistischStelsel	string	item	instant	*irrelevant*	false	true
Transactie	string	item	instant	*irrelevant*	false	true
LandVanHerkomst OfBestemming	string	item	instant	*irrelevant*	false	true
LandVanOorsprong	string	item	instant	*irrelevant*	false	true
Vervoerswijze	string	item	instant	*irrelevant*	false	true
Containervervoer	boolean	item	instant	*irrelevant*	false	true
NettoGewicht	integer	item	instant	*irrelevant*	false	true
AanvullendeStatistische Eenheid	integer	item	instant	*irrelevant*	false	true
Factuurwaarde	monetary	item	instant		false	true
StatistischeWaarde	monetary	item	instant		false	true
Handelspartner	string	item	instant	*irrelevant*	false	true
Preferentiecode	string	item	instant	*irrelevant*	false	true

In the dimension taxonomy, the traded products are defined, classified and labeled according to the Combined Nomenclature 2008. Since our taxonomy is one-dimensional (specifying concepts only by product), it contains only one dimension taxonomy. A multi-dimensional taxonomy would have multiple dimension taxonomies, one for each dimension. This is not strictly necessary but a way to organize a complex taxonomy. The product dimension and all its products are defined in a taxonomy schema file (Table 3). Several attributes are required by XBRL, but are irrelevant in a dimension taxonomy (Hoffman 2006). The *abstract* attribute is set to "true" for all products, because the products should not have a fact value in an instance document. This makes the *nillable* attribute irrelevant.

Table 3 Definition of products in Dimension Taxonomy *Products.xsd*.

Name	Type	Substitution Group	Period Type	Balance	Abstract	Nillable
DimensionProduct	string	dimensionItem	*irrelevant*	*irrelevant*	true	*irrelevant*
CN08	*irrelevant*	item	*irrelevant*	*irrelevant*	true	*irrelevant*
CN08-I	*irrelevant*	item	*irrelevant*	*irrelevant*	true	*irrelevant*
CN08-01	*irrelevant*	item	*irrelevant*	*irrelevant*	true	*irrelevant*
CN08-0101	*irrelevant*	item	*irrelevant*	*irrelevant*	true	*irrelevant*
CN08-0101.10	*irrelevant*	item	*irrelevant*	*irrelevant*	true	*irrelevant*
CN08-0101.10.10	*irrelevant*	item	*irrelevant*	*irrelevant*	true	*irrelevant*
CN08-0101.10.90	*irrelevant*	item	*irrelevant*	*irrelevant*	true	*irrelevant*
CN08-0101.90	*irrelevant*	item	*irrelevant*	*irrelevant*	true	*irrelevant*
Etc.						

The Combined Nomenclature does not only provide codes for products, it also classifies products into hierarchical levels (product aggregates). This hierarchy is captured as "parent-child" arcroles in the presentation linkbase of the dimension taxonomy (Table 4).

Table 4 Definition of product hierarchy in presentation linkbase *Products-presentation.xml*.

From	To	Arcrole	Use	Priority	Order
DimensionProduct	CN08	parent-child	optional	0	1.0
CN08	CN08-I	parent-child	optional	0	1.0
CN08-I	CN08-01	parent-child	optional	0	1.0
CN08-01	CN08-0101	parent-child	optional	0	1.0
CN08-0101	CN08-0101.10	parent-child	optional	0	1.0
CN08-0101.10	CN08-0101.10.10	parent-child	optional	0	1.0
CN08-0101.10	CN08-0101.10.90	parent-child	optional	0	2.0
CN08-0101	CN08-0101.90	parent-child	optional	0	2.0
Etc.					
CN08-15	CN08-1518.00	parent-child	optional	0	18.0
CN08-1518.00	CN08-1518.00.10	parent-child	optional	0	1.0
CN08-1518.00	CN08-1518.00.31	parent-child	optional	0	2.0
CN08-15	CN08-1520.00.00	parent-child	optional	0	19.0
CN08-15	CN08-1521	parent-child	optional	0	20.0
CN08-1521	CN08-1521.10.00	parent-child	optional	0	1.0
Etc.					

The 8-digit code of the Combined Nomenclature uniquely tags each product and product aggregate. Human-readable labels are, however, necessary to support the taxonomy user and his application. This information is stored in the label linkbase of the dimension taxonomy. In a label linkbase, products can be labeled in multiple languages through the *language* attribute. In our prototype, we included English labels (Table 5) and Dutch labels (Table 6). Each language is stored in a separate label linkbase to keep the taxonomy organized.

Table 5 English labeling of products in label linkbase *Products-label-en.xml*.

Name	Language	Label	Order
DimensionProduct	en	Dimension Product	1.0
CN08	en	Combined Nomenclature 2008	1.0
CN08-I	en	Section I - Live animals; animal products	1.0
CN08-01	en	Chapter 1 - Live animals	1.0
CN08-0101	en	Live horses, asses, mules and hinnies	1.0
CN08-0101.10	en	Pure-bred breeding horses and asses	1.0
CN08-0101.10.10	en	Pure-bred breeding horses	1.0
CN08-0101.10.90	en	Pure-bred breeding asses	2.0
CN08-0101.90	en	Live horses, asses, mules and hinnies (excl. pure-bred for breeding)	2.0
Etc.			

en = English; *role*="label"; *arcrole*="concept-label"; *use*="optional"; *priority*="0"

Table 6 Dutch labeling of products in label linkbase *Products-label-nl.xml*.

Name	Language	Label	Order
DimensionProduct	nl	Dimensie Product	1.0
CN08	nl	Gecombineerde Nomenclatuur 2008	1.0
CN08-I	nl	Afdeling I - Levende dieren en producten van het dierenrijk	1.0
CN08-01	nl	Hoofdstuk 1 - Levende dieren	1.0
CN08-0101	nl	Levende paarden, ezels, muildieren en muilezels	1.0
CN08-0101.10	nl	- fokdieren van zuiver ras	1.0
CN08-0101.10.10	nl	fokpaarden van zuiver ras	1.0
CN08-0101.10.90	nl	fokezels van zuiver ras	2.0
CN08-0101.90	nl	- andere	2.0
Etc.			

nl = Dutch; *role*="label"; *arcrole*="concept-label"; *use*="optional"; *priority*="0"

The primary taxonomy and dimension taxonomy are imported into the template taxonomy, in which hypercubes are defined, as well as the relationships between primary concepts and hypercubes. A hypercube is an *n*-dimensional space in which the primary concepts are expressed (Table 7). Thus, despite its name, a hypercube can also contain less than four dimensions (*n* is a non-negative integer). Hypercubes are defined in a taxonomy schema file (Table 8). By definition, they are of *type* "string", they have a special *substitutionGroup* and the *abstract* attribute is set to "true". The other attributes are irrelevant.

Table 7 Analogy between an *n*-dimensional space and an *n*-dimensional XBRL taxonomy, where *n* is the number of dimensions.

n	Space	XBRL taxonomy
0	point	e.g. sales
1	line	e.g. sales by product
2	square	e.g. sales by product and activity
3	cube	e.g. sales by product, activity and country
Etc.		

Table 8 Definition of hypercubes in Template Taxonomy *Template.xsd*.

Name	Type	Substitution Group	Period Type	Balance	Abstract	Nillable
HypercubeAllProducts	string	hypercubeItem	*irrelevant*	*irrelevant*	true	*irrelevant*
HypercubeProductAggregates	string	hypercubeItem	*irrelevant*	*irrelevant*	true	*irrelevant*

In the definition linkbase of the template taxonomy (Table 9; Fig. 2), the relationships between primary concepts, hypercubes, dimensions, domains and domain members are defined. First, we created a hypercube named *HypercubeAllProducts* in a separate extended linkrole. This hypercube is linked to the product dimension through a hypercube-dimension arcrole. The product dimension is linked to the product domain through a dimension-domain arcrole. The product domain is linked to all products and product aggregates through domain-member arcroles. Second, we linked each dimensional concept to this hypercube in another extended linkrole through an "all" arcrole (Table 9; Figs. 2 and 3).

We wanted to force instance creators to choose a product at the highest level of detail, i.e. at the deepest branch of the product hierarchy. To achieve this, we created a second hypercube named *HypercubeProductAggregates* in a separate extended linkrole (Table 9; Fig. 2). This hypercube differs from *HypercubeAllProducts* by only one aspect. Instead of all products and product aggregates, it contains only the product aggregates as domain-members, thus excluding the leaves. We linked each dimensional concept to this hypercube through a "notAll" arcrole (Table 9; Figs. 2 and 3). The net result is that an instance document referring to this taxonomy contains white cells allowing fact values (√) only for the leaves of the product hierarchy, and gray cells not allowing fact values (×) for all the other nodes (Fig. 3). Replacing *HypercubeAllProducts* by a hypercube containing only the product leaves does not work. Each cell has to be allowed first (by an "all" arcrole) before it can be disallowed (by a "notAll" arcrole).

Table 9 Relationship definitions between primary concepts, hypercubes, dimensions, domains and domain members in definition linkbase *Template-definition.xml*. This requires import of primary taxonomy *PrimaryConcepts.xsd* and dimension taxonomy *Products.xsd*.

Extended linkrole	From	To	Arcrole	TargetRole	Use	Priority	Order
A							
	HypercubeAllProducts	DimensionProduct	hypercube-dimension		optional	0	1.0
	DimensionProduct	CN08	dimension-domain		optional	0	1.0
	CN08	CN08-I	domain-member		optional	0	1.0
	CN08-I	CN08-01	domain-member		optional	0	1.0
	CN08-01	CN08-0101	domain-member		optional	0	1.0
	CN08-0101	CN08-0101.10	domain-member		optional	0	1.0
	CN08-0101.10	CN08-0101.10.10	domain-member		optional	0	1.0
	CN08-0101.10	CN08-0101.10.90	domain-member		optional	0	2.0
	CN08-0101	CN08-0101.90	domain-member		optional	0	2.0
	Etc.						
B							
	HypercubeProductAggregates	DimensionProduct	hypercube-dimension		optional	0	1.0
	DimensionProduct	CN08	dimension-domain		optional	0	1.0
	CN08	CN08-I	domain-member		optional	0	1.0
	CN08-I	CN08-01	domain-member		optional	0	1.0
	CN08-01	CN08-0101	domain-member		optional	0	1.0
	CN08-0101	CN08-0101.10	domain-member		optional	0	1.0
	CN08-0101	CN08-0101.90	domain-member		optional	0	2.0
	Etc.						
C							
	Factuurwaarde	HypercubeAllProducts	all	A	optional	0	1.0
	Factuurwaarde	HypercubeProductAggregates	notAll	B	optional	0	2.0
	NettoGewicht	HypercubeAllProducts	all	A	optional	0	1.0
	NettoGewicht	HypercubeProductAggregates	notAll	B	optional	0	2.0
	Etc.*						

*All primary concepts are dimensional except “BTW-nummer” and “NaamInformatieplichtige”.

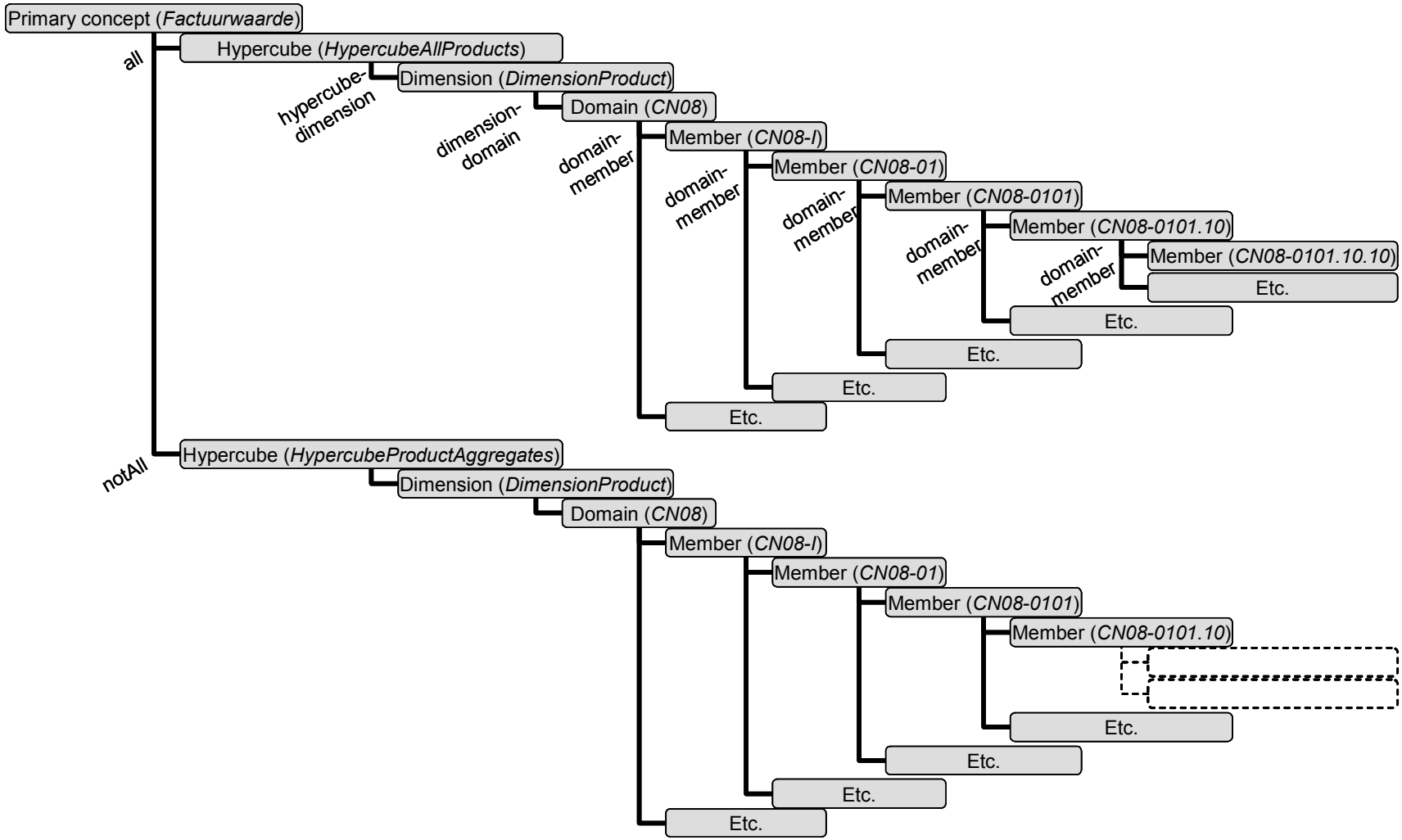

Figure 2 Linking primary concepts, hypercubes, dimensions, domains and domain members through arcroles (diagonal text) in the definition linkbase of the template taxonomy. This is a one-dimensional taxonomy since hypercubes contain only one dimension (product).

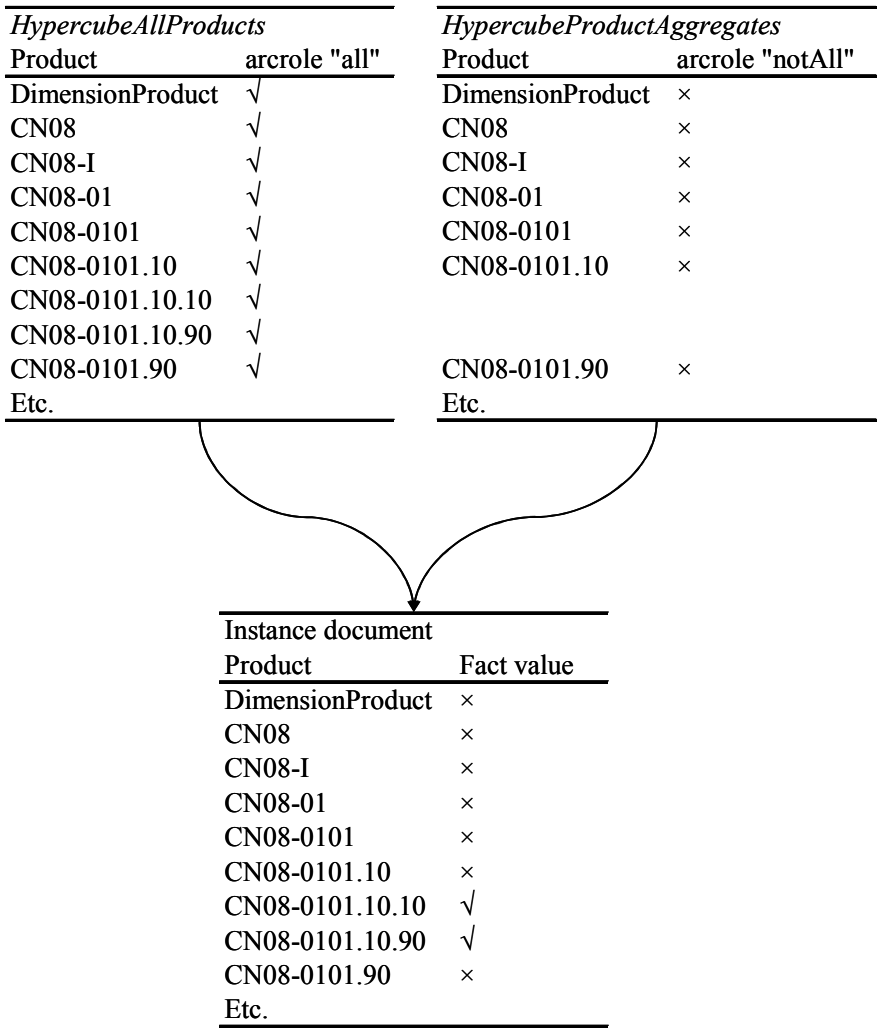

Figure 3 Use of hypercubes and all/notAll arcroles to define in an instance document the white cells (√) in which fact values are allowed, and gray cells (×) in which fact values are not allowed.

3.1.2 Instance document

Now that we have defined the international trade concepts in a dimensional taxonomy, it is possible to report fact values for these concepts specified by product in an instance document. The first step in creating an instance document is to import the template taxonomy defining the concepts to be reported. The next step is to define context information for each fact value (Table 10). Non-dimensional concepts could refer to the same context. However, the dimensional taxonomy specifies that a separate context has to be created for each traded product, i.e. up to 9700 contexts. XWand has a built-in function to create these contexts. The third step is to define the units in which the concepts are expressed (Table 11). Two trade concepts are monetary (Table 2) and are expressed in Euros, and one is weight expressed in kilogram. All the other 30 units are supplementary units in the Combined Nomenclature. For example, horses should be reported in number of items and diamonds in carats. Finally, fact values can be reported for each concept by product (see Table 12 and Fig. 4 for an example with imaginary fact values).

Table 10 Contexts in instance document *Instance.xml*.

Context ID	Entity ID	Entity scheme	Period	Scenario
CompA_2007	Company A	http://www.companyA.com	2007-12-31	
CompA_2007_CN08-0101.10.10	Company A	http://www.companyA.com	2007-12-31	<xbrldi:explicitMember dimension="template:DimensionProduct"> products:CN08-0101.10.10 </xbrldi:explicitMember>
Etc.				

Table 11 Units in instance document *Instance.xml*.

Unit ID	Measure
U-Euros	iso4217:EUR
U-Kilogram	xbrli:pure
U-NumberOfCells	xbrli:pure
U-Gram	xbrli:pure
U-GramOfFissileIsotopes	xbrli:pure
U-Carats	xbrli:pure
U-KilogramOfSubstance90PercentDry	xbrli:pure
U-KilogramOfHydrogenPeroxide	xbrli:pure
U-KilogramOfPotassiumOxide	xbrli:pure
U-KilogramOfPotassiumHydroxide	xbrli:pure
U-KilogramOfNitrogen	xbrli:pure
U-KilogramOfSodiumHydroxide	xbrli:pure
U-KilogramOfDiphosphorusPentaoxide	xbrli:pure
U-KilogramOfUranium	xbrli:pure
U-ThousandKilowattHours	xbrli:pure
U-Liter	xbrli:pure
U-LiterPure100PercentAlcohol	xbrli:pure
U-Meter	xbrli:pure
U-SquareMeter	xbrli:pure
U-CubicMeters	xbrli:pure
U-ThousandCubicMeters	xbrli:pure
U-NumberOfPairs	xbrli:pure
U-NumberOfItems	xbrli:pure
U-HundredItems	xbrli:pure
U-ThousandItems	xbrli:pure
U-TeraJoule	xbrli:pure
U-CarryingCapacityInTonnes	xbrli:pure
U-ThousandLiters	xbrli:pure
U-KilogramOfMethylAmines	xbrli:pure
U-KilogramDrainedNetWeight	xbrli:pure
U-KilogramOfCholineChloride	xbrli:pure
U-GrossTonnage	xbrli:pure

Table 12 Imaginary fact values in dimensional instance document *Instance.xml*.

Element Name	Context Ref	Unit Ref	Decimals	Fact value
BTW-nummer	CompA_2007			000000000B01
NaamInformatieplichtige	CompA_2007			Company A
IntraHandel	CompA_2007_CN08-0101.10.10			true
Regelnummer	CompA_2007_CN08-0101.10.10			000001
Administratienummer	CompA_2007_CN08-0101.10.10			130098
Goederenstroom	CompA_2007_CN08-0101.10.10			ICL
StatistischStelsel	CompA_2007_CN08-0101.10.10			Reguliere uitvoer
Transactie	CompA_2007_CN08-0101.10.10			Koop, verkoop of huurkoop
LandVanHerkomstOfBestemming	CompA_2007_CN08-0101.10.10			Duitsland
LandVanOorsprong	CompA_2007_CN08-0101.10.10			Niet van toepassing
Vervoerswijze	CompA_2007_CN08-0101.10.10			Wegvervoer
Containervervoer	CompA_2007_CN08-0101.10.10			Niet van toepassing
NettoGewicht	CompA_2007_CN08-0101.10.10	U-Kilogram	0	2000
AanvullendeStatistischeEenheid	CompA_2007_CN08-0101.10.10	U-NumberOfItems	0	2
Factuurwaarde	CompA_2007_CN08-0101.10.10	U-Euros	0	3000
StatistischeWaarde	CompA_2007_CN08-0101.10.10			Niet van toepassing
Handelspartner	CompA_2007_CN08-0101.10.10			000000000B02
Preferentiecode	CompA_2007_CN08-0101.10.10			Niet van toepassing
IntraHandel	CompA_2007_CN08-0406.90.15			true
Regelnummer	CompA_2007_CN08-0406.90.15			000002
Etc.				

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!-- Generated by Fujitsu XWand 80072_01T -->
<xbrli:xbrl xmlns:xbrli="http://www.xbrl.org/2003/instance"
xmlns:iso4217="http://www.xbrl.org/2003/iso4217"
xmlns:link="http://www.xbrl.org/2003/linkbase" xmlns:xbrldi="http://xbrl.org/2006/xbrldi"
xmlns:xbrldt="http://xbrl.org/2005/xbrldt" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:primary="http://www.cbs.nl/PrimaryConcepts" xmlns:products="http://www.cbs.nl/Products"
xmlns:template="http://www.cbs.nl/Template">
  <link:schemaRef xlink:href="Template.xsd" xlink:type="simple"/>
  <xbrli:context id="CompA2007">
    <xbrli:entity>
      <xbrli:identifier scheme="http://www.companyA.com">
        Company A
      </xbrli:identifier>
    </xbrli:entity>
    <xbrli:period>
      <xbrli:instant>
        2007-12-31
      </xbrli:instant>
    </xbrli:period>
  </xbrli:context>
  <xbrli:context id="CompA2007_CN08-0101.10.10">
    <xbrli:entity>
      <xbrli:identifier scheme="http://www.companyA.com">
        Company A
      </xbrli:identifier>
    </xbrli:entity>
    <xbrli:period>
      <xbrli:instant>
        2007-12-31
      </xbrli:instant>
    </xbrli:period>
    <xbrli:scenario>
      <xbrldi:explicitMember dimension="template:DimensionProduct">
        products:CN08-0101.10.10
      </xbrldi:explicitMember>
    </xbrli:scenario>
  </xbrli:context>
  <xbrli:unit id="U-Euros">
    <xbrli:measure>
      iso4217:EUR
    </xbrli:measure>
  </xbrli:unit>
  <primary:BTW-nummer contextRef="CompA2007">
    000000000B01
  </primary:BTW-nummer>
  <primary:Factuurwaarde contextRef="CompA2007_CN08-0101.10.10" decimals="0" unitRef="U-Euros">
    3000
  </primary:Factuurwaarde>
</xbrli:xbrl>
```

Fig. 4 Sample instance document with a non-dimensional context ("CompA_2007") for a non-dimensional concept ("BTW-nummer") and a dimensional context ("CompA_2007_CN08-0101.10.10") for a dimensional concept ("Factuurwaarde").

3.2 Problems

In the previous section, we have described how we created a dimensional taxonomy for International Trade Statistics, and an instance document in which international trade concepts can be reported by product. In this section, we describe some practical and more fundamental problems that we encountered during the process. The first three are XBRL related; the fourth applies to the Combined Nomenclature.

First, XBRL in general and XBRL Dimensions in particular is a relatively new field. As a consequence, the developments are ahead of the literature. Most booklets on XBRL are written for software vendors, accountants and CFO's, and avoid technical details (Jacobs 2007; Vreeburg and Verkruijsse 2004; Bergman and Snijders 2008; Weverka and So 2008). The XWand user's guide only describes what buttons do, not why, how and when they should be applied. Several resources provide useful but scattered information (e.g. Richards 2002a,b; Van der Heiden 2006; Hommes 2007; Daas and Stroom 2006; Roos 2008). XBRL International has published

recommendation documents that are valuable resources but aimed at an initiated audience (Hernández-Ros and Wallis 2006; Engel et al. 2008). Arguably the best handbook is Hoffman's (2006) guide, which is unfortunately a rather hastily written draft and lacks an index.

Second, the function of an XBRL domain is unclear. A dimension usually has only one domain, which is the root of the dimension taxonomy (Fig. 2). The domain can then take on a value (*abstract*="false"), in contrast to a dimension (*abstract*="true"). However, it is the primary concepts that contain values, not the domains or domain members (Table 3). In addition, domain members can be hierarchically ordered with product aggregates also being domain members (Fig. 2). If product aggregates can be domain members, why could the root not also be a domain member? In some taxonomies, the root is indeed a domain member (Hamm 2006). In those situations, however, the domain seems even more redundant. Why are the root, the other product aggregates, and the products not *dimension* members without intervention of a domain? The domain might have a function, but it is not clear in practice or well explained in the scarce literature.

Third, we encountered some problems during the creation of an instance document. In a dimensional taxonomy, only dimensional concepts are linked to hypercubes, non-dimensional concepts are not. In an instance document, however, non-dimensional concepts can refer to dimensional contexts without a validation error. The *decimals* attribute of an integer can exceed zero without a validation error. An integer for which the *decimals* attribute is not specified does yield a validation error. These could be software-specific problems (Daas 2005). Furthermore, products can be labeled in multiple languages in a label linkbase of the taxonomy. Units, on the other hand, are defined in the instance document. It would be better if the taxonomy creator could define the units and provide standard labels for those units from which the instance creator could choose the language. Moreover, some products in the Combined Nomenclature have a supplementary unit. For example, poultry eggs for hatching should be expressed in number of items, whereas poultry eggs not for hatching should be expressed in thousand items. Although these 30 supplementary units can be defined in the instance document (Table 11), they are not linked to specific products. Instead, any unit can be defined and chosen in an instance document. The instance creator is left in the dark because the correct use cannot be defined in the taxonomy.

Finally, the Combined Nomenclature contains several inconsistencies. There are no less than 11 hierarchical levels in the human-readable labels, but only 4 hierarchical levels in the 8-digit code (see Fig. 5 and Appendix 1 for the structure of the code). For example, the first level in the labels consists of 21 Sections, each containing one to several Chapters. In the first level of the code, however, all 97 Chapters are numbered consecutively. Similarly, Chapter 28 is subdivided into 51 Headings according to the code, but according to the labels it is subdivided into 6 groups that have a label but no code.

Sometimes the code suggests a subdivision that does not exist. For example, parent 1521.90 has three children: 10, 91 and 99 (Fig. 5). The code, however, suggests that it has two children (10 and 9) and two grandchildren (1 and 9), both of child 9. Similarly, when the CN Subheading equals "00", the product's parent does not exist (Fig. 5). When the HS Subheading equals "00", the product's grandparent does not exist (Fig. 5). This affects the domain-member relationships (Table 9) and brakes down the logical link between code and hierarchy.

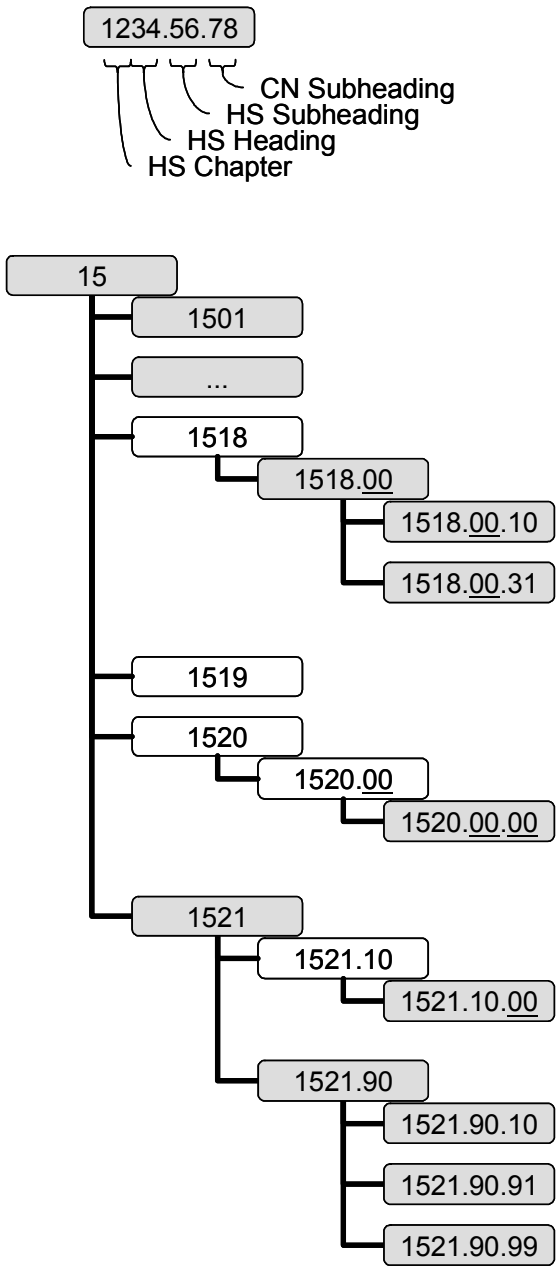

Fig. 5 Snapshot from the hierarchical structuring of traded products according to the Combined Nomenclature (CN) 2008, which is a European specification of the Harmonized System (HS). White nodes do not exist.

Numbering is not always consecutive. For instance, Chapter 76 is followed by Chapter 78 and node 1518 is followed by 1520 (Fig. 5). This affects the *order* attribute (Table 4). Historical reasons might account for the inconsistency, but it is nevertheless an inconsistency.

There is no list of Dutch labels in which all nodes have a unique label (Table 1). Both the EU (2007) and CBS-IRIS apply a list that contains a Dutch label for every node, but not all labels are unique and informative (e.g. "Other" occurs multiple times). The National Bank of Belgium applies a list that contains unique Dutch labels, but only for the leaves (products) and not for the other nodes (product aggregates). Eurostat RAMON applies a list that contains unique Dutch labels for Sections, Chapters and Headings, but not for HS Subheadings and CN Subheadings (except when the HS Subheading equals "00"). Eurostat RAMON does apply a list with unique labels for all nodes in English, German and French. Moreover, the list of Eurostat RAMON ends with Chapter 98, whereas the list of the National Bank of Belgium does not contain Chapter 98 and ends with four products in Chapter 99. CBS-IRIS ends with Chapter 97. Furthermore, special characters in the Dutch labels from Eurostat RAMON had to be fixed before import into XBRL (Appendix 2).

4. Discussion

We have created a prototype of a dimensional XBRL taxonomy applied to International Trade Statistics. We have shown that an XBRL taxonomy can include a dimension that is hierarchical, contains multilingual labels for each product, and is constructed in a way that instance creators are forced to choose only the most detailed level of the product classification. We have also argued that the literature lags behind the XBRL developments, that XBRL domains seem redundant, that taxonomy creators still have insufficient control over an instance document, and that there are several inconsistencies in the Combined Nomenclature.

We focused our research on the product dimension, because International Trade Statistics causes the highest administrative burden and has product as its key dimension. However, dimensional taxonomies could also be made with other dimensions, such as country or economic activity. Both dimensions are statistically important but less complex than the product dimension. For both dimensions, international standards have been developed: ISO 3166 contains codes and names of 246 countries, and ISIC contains codes and names of 900 economic activities. ISIC is subdivided by the European NACE, which is subdivided by national classifications (e.g. the Dutch SBI). As we have shown, such hierarchical information can also be incorporated. Using a two-dimensional product-by-activity taxonomy, one could also present a preselection of products that are relevant to a company.

Standardization is not always desirable or possible. The worldwide distribution of fast food companies like McDonald's does not appeal to travelers who enjoy gastronomical challenges. Muslim societies will not adopt the Gregorian calendar,

Christian societies will not adopt the Islamic calendar, and neither is likely to adopt the World Calendar. The metric system might be more logical than the imperial system, but its global implementation is resisted for reasons of convenience, logistics and politics. Driving on the right side of the road is not better or worse than driving on the left, but adopting a global standard involves large investments and potential risks. Standardization of financial reporting, on the other hand, is both desirable (cheaper, faster, better) and possible (XBRL). Our study suggests that despite some flaws, XBRL Dimensions is a useful specification for reporting international trade in particular and dimensional information in general.

Standardization requires, however, that several parties agree on the standard. Imposing a standard will be difficult by a statistical office or a single country. For XBRL to be successful, it is necessary that the standard is embraced by several institutions, such as Eurostat, tax offices and customs. Mass is needed, which can be provided by standardization committees such as those of the United Nations, or by legislative bodies such as the European Union.

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7. Appendices

Appendix 1 Definitions of terms used in this report.

Term	Definition
XML	eXtensible Markup Language: artificial language developed to structure and exchange information in an internationally standardized way
XBRL	eXtensible Business Reporting Language: implementation of XML for financial information
Taxonomy	XBRL file (*.xsd) defining financial reporting concepts
Instance Document	XBRL file (*.xml) containing business facts about the concepts defined in the taxonomy.
XBRL Dimensions	XBRL module that allows specification of dimensional concepts. Examples of dimensions are country, time, product and economic activity
IFRS	International Financial Reporting Standards: definition of international accounting principles
IFRS-GP	IFRS-General Purpose: XBRL taxonomy (*.xsd) defining international financial reporting concepts
NTP	*Nederlands Taxonomie Project* (Dutch Taxonomy Project): project initiated in 2004 by the Ministries of Justice and Finance to reduce the administrative burden on companies
OTP	*OverheidsTransactiePoort* (Government Gateway): electronic post office of the Dutch government
HS	Harmonized System: internationally standardized system of 6-digit coding, naming and classifying traded products
CN	Combined Nomenclature: 8-digit European specification of HS
HS Chapter	First level (digits 1 and 2) of the CN product code
HS Heading	Second level (digits 3 and 4) of the CN product code
HS Subheading	Third level (digits 5 and 6) of the CN product code
CN Subheading	Fourth level (digits 7 and 8) of the CN product code
NST/R	*Nomenclature uniforme des marchandises pour la Statistique de Transport, Révisé*: 3-level alternative classification of products
ISIC	International Standard Industrial Classification: internationally standardized system of 2-digit coding and naming of economic activities
NACE	Statistical Classification of Economic Activities in the European Community: 4-digit European specification of ISIC
SBI	*Standaard BedrijfsIndeling* (Standard Classification of Economic Activities): 5-digit Dutch specification of NACE
ISO	International Organization for Standardization: non-governmental organization that develops international standards
Hierarchy	A structuring of elements
Node	An element in a hierarchy
Parent	The node one hierarchical level above a node
Root	The node without a parent
Child	A node with a parent
Leaf	A node without children

Appendix 2 Correction of special characters in Dutch labels.

Original character	Replaced by
″ (double quote)	′
″ (two single quotes)	′
â€ž	′
â€□	′
-Â	-
Â	
Ã¤	ä
Ã£	ã
Ã«	ë
Ã‹	Ë
Ã©	é
Ã‰	É
Ã¨	è
Ãª	ê
Ã¯	ï
Ã□	Ï
Ã±	ñ
Ã¶	ö
Ã³	ó
Ã´	ô
Ã¼	ü
Î±	α
Î²	β
ÃŸ	β
Ã—	×
Ã¸	ø